Chapter 5 Estuary and Coastal Assessment

Aquatic Life Designated Use Milestone: Maintain and enhance aquatic life designated uses in assessed tidal waters.

5.1 Estuary and Ocean Aquatic Life Assessment

New Jersey's estuaries provide a rich spawning ground for many aquatic species. These species are important for recreational and commercial fishing and shellfishing, as well as important components of the aquatic ecosystem.

Various Programs within the New Jersey Department of Environmental Protection (NJDEP) have oversight for protecting coastal environments (e.g., water quality, fin- and shellfisheries, bathing beaches, land use permitting, etc.); management planning (e.g., Coastal Zone Management, Wastewater) and public policy implementation (e.g., Coastal Areas Facility Review Act). These Programs and descriptions of their activities can be found at NJDEP's Website (www.state.nj.us/dep/). In addition, NJDEP participates in a number of multi-state, estuarine management programs such as the Interstate Environmental Commission (IEC) formerly Insterstate Sanitation Commission, the Delaware River Basin Commission (DRBC) and three National Estuary Programs (i.e., NY/NJ Harbor Estuary and NY Bight Restoration Plan, Delaware Estuary Program and Barnegat Bay Estuary Program).

New Jersey's estuarine waters are assessed in conjunction with two interstate agencies, the Interstate Environmental Commission (IEC) and the Delaware River Basin Commission (DRBC). New Jersey assesses and reports on the estuarine waters within the southern half of Raritan Bay, Sandy Hook Bay and the back-bay waters from the Navesink estuary south to the eastern tip of Cape May (see Figure A5.1-1). The IEC assesses and reports on the waters in the New York/New Jersey Harbor, specifically the northern portion of Raritan Bay, Newark Bay, the Arthur Kill and Kill Van Kull, Upper New York Bay and the Lower Hudson River. The DRBC assesses and reports on the Delaware River and Bay. This New Jersey Water Quality Inventory Report does not include the observations and assessments published by the IEC or DRBC. For information regarding waters overseen by these two interstate agencies, please refer to the corresponding addresses provided in the front of this report.

5.1.1 Estuarine Aquatic Life Assessment Method

Dissolved oxygen (DO) is necessary for almost all forms of aquatic life and monitoring data are readily available. Therefore, DO status was selected as an indicator for this aquatic life designated use assessment. However, because many open water aquatic species are mobile and/ or naturally tolerant of transient low DO occurrences, DO is an indirect indicator of aquatic life designated uses. As discussed in the sections that follow, additional data and assessments are needed to improve this assessment.

NJDEP's Bureau of Marine Monitoring collects quarterly data for DO, salinity, temperature, pH, suspended solids and nutrients at approximately 170 sites in New Jersey's estuarine waters through the Marine and Estuarine Water Quality Monitoring Program (see Figure A5.1.1-1 in the Appendix). This aquatic life assessment is based upon subsurface dissolved oxygen (DO) levels

recorded between 1995 and June 1997. Water column DO levels at or above 4 mg/l were considered acceptable based upon New Jersey's Surface Water Quality Standards (N.J.A.C. 7:9B) within the waters assessed here. This assessment method was based on EPA Guidance for the Preparation of Water Quality Inventory Reports (USEPA, 1997) and is summarized below on Table 5.1.1-1. Because the data used for the Aquatic Life Designated Use assessment are 5 years old or less, the assessment is based on monitored data.

Table 5.1.1-1: Estuary Aquatic Life Use Assessment

Use Support Assessment	Dissolved Oxygen Concentrations
Full Support	DO <4 mg/l in 0 to 10% of the samples
Partial Support	DO <4 mg/l in 11 to 25% of samples
No Support	DO <4 mg/l in >25% of samples

5.1.2 Estuary Aquatic Life Assessment Results

New Jersey's estuaries from southern Raritan Bay south to Cape May had sufficient dissolved oxygen levels to support a healthy biota except within a cluster of shallow estuaries contained within Atlantic and Ocean Counties, beginning in the center of Manahawkin Bay and extending south to Great Egg Harbor Inlet (see Fig. A5.1-1). Of the total 264.3 square miles of estuary assessed here, 203.3 were assessed as fully supporting the Aquatic Life designated use. Of the remaining square miles, 61 partially support the use and 0 do not support the use.

Table 5.1.2-1: Estuary Aquatic Life Assessment Results

Use Support Status	Square Miles	Percent of Assessed Waters
Full Support	203.3	76.8%
Partial Support	61	23.2%
No Support	0	0%
Total	**264.3**	**100%**

Some important considerations associated with this assessment include:

1. Within coastal waters in general, most finfish either tolerate the conditions if they are marginal or avoid the areas altogether if conditions are severe.

2. Data employed to support this indicator are limited. In estuaries for example, there were no more than 7 values per site over a 3 year period, with many sites with less data.

3. In estuaries, the low DO values were typically only slightly below the SWQS criterion of 4 mg/l, and except for a few readings, were rarely below 3 mg/l.

5.1.3 Estuary Aquatic Life Source and Cause Assessment

Factors contributing to low dissolved oxygen concentrations in New Jersey estuaries are discussed in Zimmer and Groppenbacher (1999) and are both natural and anthropogenic.

Estuarine DO levels are characteristically lowest in summer, when water is warm and biological activity is at its highest. Many of the estuaries along the New Jersey coast are shallow waterbodies, often with poor mixing which contributes to the warming of the waters in summer that in turn contribute to low oxygen levels. An additional contributing factor to low DO is input~~s~~ of naturally oxygen depleted waters from adjacent wetlands especially during ebb tides.

Recorded low DO conditions have often been found to coincide with phytoplankton bloom die-off, the resulting decay of which contributes to water column oxygen consumption during the bloom die-off phase. Anthropogenic inputs of nutrients have contributed to elevated nutrient levels that are in turn believed to contribute to periodic phytoplankton blooms.
Anthropogenic inputs include nonpoint sources such as:

- surface runoff from agricultural and developed lands, transported by direct stormwater discharges and tributary inputs;
- direct ground water inputs of nitrogen from historical deposition;
- wet and dry atmospheric deposition of nitrogen oxide emissions, primarily from fossil fuel combusiton (Jaworski, et. al. 1997) which in the Barnegat Bay has been estimated to represent a substantial nitrogen load (USGS, written communication, 8 August 2000); and
- other sources such as large waterfowl populations and sediment resuspension through boat-created turbulence.

In addition, NJDEP recognizes that multi-media approaches to environmental assessment and management are best when dealing with contaminants that may be transported through differing media. Understanding the effects of air deposition and other non-point sources of pollution to coastal waters, including contaminant composition and magnitude of potential load, is critical to scientists and policy makers in formulating watershed-based management strategies and regional solutions to environmental issues. Recent investigations (Jaworski et. al. 1997) have estimated that for ten benchmark watersheds in the United States, including the Hudson and Delaware Basins on either side of New Jersey, the riverine nitrogen fluxes of nitrogen were highly correlated with atmospheric deposition onto their landscapes and also with nitrogen oxide emissions from their airsheds. More locally, a study of Barnegat Bay in New Jersey, a typical shallow Atlantic coast embayment, indicated that over 75% of the nitrogen input to the bay is from atmospheric deposition (Seitzinger and Sanders 1999).

To address these multi-media concerns, NJDEP has established the statewide New Jersey Atmospheric Deposition Network (NJADN) which samples gaseous, particulate, and precipitation concentrations of a number of contaminants at nine sites throughout the State. The NJADN, through the collection of data that address wet and dry deposition and air-water exchange of atmospheric pollutants, will provide estimates of direct loadings to surface waters. Such data will be especially important for aquatic systems that have large surface areas relative to watershed areas, such as coastal areas. Preliminary findings of the NJADN are available for a number of pollutants. Findings for nitrate confirm earlier estimates that air deposition of nitrogen may be significant for some watersheds. The annual wet deposition of nitrate throughout the State, as measured by the NJADN, ranged from 22 to 30 $mmol/m^2/yr$ (Eisenreich & Reinfelder, 2001). With the assumption that nitrate represents roughly half of the total

dissolved nitrogen in rain (with the remainder either ammonium or dissolved organic nitrogen), average total nitrogen fluxes to terrestrial areas and coastal waters of the State are approximately 0.7 gram/m^2/yr.

5.1.4 Ocean Waters Aquatic Life Assessment Methods

Aquatic life assessment for ocean waters in New Jersey is based upon water column dissolved oxygen (DO) levels recorded by the USEPA helicopter during June through September, 1995 through 1998. (USEPA, 1999). A series of 10 transects extend east along the New Jersey coastline from Sandy Hook south to Cape May with samples taken at 1, 3, 5, 7, and 9 mile points along each transect. Samples are collected eight to ten times during the critical summer period. At each site, two samples are collected, one at one meter below the surface and one at one meter above the ocean floor. Ocean depths ranged from 20 to 75 meters.

For the purposes of this assessment only data from the 1 and 3 mile points were utilized (both surface and bottom) in order to limit the assessment to waters within New Jersey's three mile jurisdiction (Fig. A5.1). Because the data supporting the Aquatic Life Designated use assessment here are 5 years old or less, they are regarded as monitored.

Water column DO levels at or above 5 mg/l were considered acceptable based upon New Jersey Surface Water Quality Standards (N.J.A.C. 7:9B) within the waters assessed here. Sampling sites assessed as fully supporting the Aquatic Life Use exhibited acceptable DO in zero to ten percent of the data (top and bottom assessed together). Sites assessed as fully supporting but threatened exhibited unacceptable DO levels in 11 percent of samples or greater (see table 5.1.4-1 below).

Table 5.1.4-1: Ocean Water Aquatic Life Use Assessment

Use Support Assessment*	Dissolved Oxygen
Full Support	DO <5 mg/l in 0 to 10% of the samples
Full Support But Threatened (see note)	DO <5 mg/l in > 11% of samples
Note: DO concentrations are an indirect indicator of aquatic life use attainment. As discussed in Section 5.1.5 below, additional data are needed to improve this assessment. As additional data are collected and assessed, the assessment method and results will be adjusted to reflect the new information.	

Spatial Extent of Assessment: A total of 446 square statute miles of ocean were assessed based on data collected at 19 sites. Each site was assumed to represent 23.5 square statute miles (1/19 of the total area).

5.1.5 Ocean Water Aquatic Life Assessment Results

Of 446 square (statute*) miles assessed (Sandy Hook south to Cape May and out 3 nautical** miles) 21 percent (94 sq. statute mi.) fully support the Aquatic Life Use and the remaining 79

* Statute mile equals 5280 feet; a nautical mile is 6080 feet.

percent (352 sq. statute mi.) are threatened. The areas of full support are centered approximately one mile off the coast around Sandy Hook, Atlantic City, Corson Inlet and Hereford Inlet.

Some important considerations associated with these assessment results include:
Low DO occurrences were transient: USEPA personnel indicated that based on experience, the regions exhibiting low DO are transient, forming during the summer months and disappearing during the fall turnover and not forming again until the following summer when the waters re-stratify (Randy Braun, personal communication).

Low DO occurred on the ocean bottom: DO readings collected at one meter below the surface indicate acceptable DO and almost all exceedences of criteria were recorded on the ocean bottom (one meter off the bottom). Additional data within the water column are needed to characterize the volume of the low DO cells.

Lack of annual data: USEPA data used for this assessment were collected during the most stressful period of the year (June through August) when DO levels are lowest, and as such, are not gathered to specifically assess the attainment of aquatic life designated uses year-round.

Lack of biological data: DO concentrations provide an indirect indicator of aquatic life designated use attainment. In open waters, fish can avoid areas with low DO, and many crustaceans are naturally tolerant of temporary low DO conditions. Therefore, the significance of temporary low DO conditions to aquatic life uses is unclear at this time. Clearly, biological data such as recorded fish kills or assessments of invertebrate populations would significantly enhance this assessment. As additional data are compiled, the assessment methods and results will be adjusted to reflect the new information.

5.1.6 Coastal Aquatic Life Source and Cause Assessment

Occurrences of low DO in the ocean has been attributed to a combination of natural processes and anthropogenic inputs of nutrients. Ocean waters naturally stratify as they warm in the summer. As phytoplankton bloom and die during the summer, natural biological activity decomposes the algae which in turn reduces DO levels near the ocean floor. The rate, timing and extent of phytoplankton cycles may be worsened by nutrient inputs from near shore waters.

USEPA (1999) attributed the low DO in the near shore waters to the oxygen demand created by river inputs, offshore sewerage treatment plant inputs (there are 15 outfalls in the New Jersey coastal waters, see Figure A5.2.3-2), stormwater runoff and the influence of the plume from the Hudson/Raritan River estuary system. Zimmer and Groppenbacher (1999) also mention the presence of ocean sanitary discharges as a potential source contributing nutrients to offshore waters. Atmospheric contributions to nutrient enrichment occur in the ocean but, in contrast to estuaries, their relative significance appears to be minor when contrasted to other inputs (NY-NJ Harbor Estuary Program, 1996).

5.1.7 Maintaining and Improving Aquatic Life in Coastal Waters

Improve the basis for aquatic life assessments: Additional biological datasets will be explored and, as appropriate, integrated into future assessments of aquatic life in coastal waters. Major

datasets include: fish and shellfish population data collected by the Division of Fish and Wildlife and other entities; ocean biological monitoring performed in the vicinity of the 15 ocean STP outfalls through NJPDES permits; data regarding fish kills and chlorophyll a data collected via satellite. Additional assessments are also expected to become available through publication of the Barnegat Bay Estuary Program's Characterization and Assessment.

Develop a "fishable index": NJDEP is developing a fishable index that relates to the Clean Water Act's "Fishable Goal" that considers fish and shellfish population and consumption issues. The improved basis for aquatic life assessments is expected to provide data needed to support development of the fishable index. Progress on development of the fishable index will be reported in the next Water Quality Inventory Report.

Continue to monitor and assess air deposition of nutrients to coastal waters: NJDEP is operating an Air Deposition Monitoring Network that includes nutrient data collection. This network is expected to provide important data related to nutrient fluxes to estuarine and ocean waters from air deposition. These nutrient fluxes, in addition to land based sources, may play an important role in algal blooms in these waters that contribute to episodes of low DO.

Manage nutrient loads to coastal waters: As appropriate, based on the assessments above, additional measures to manage nutrient loads to coastal waters may be needed. It is important to observe that pollution sources influencing ocean impairment are interstate in nature and their remediation is also. Management measures within the waters discussed here must be the responsibility of New Jersey, New York City and New York State. A nutrient Total Maximum Daily Load (TMDL) analysis is being planned through the New York-New Jersey Harbor Estuary Program.

5.2 Estuarine and Coastal Recreational Designated Use Assessment

Subgoal 2. Protect recreational designated uses in tidal and non-tidal waters.

Milestones/Objectives: Maintain and improve the current number and quality of suitable lake, ocean and bay bathing beaches in NJ.

Milestone: By 2005, 100% of New Jersey's coastal recreational beach waters will be safe for swimming

New Jersey's coastal beaches and waterways are very intensely used for recreational purposes. This resource includes 138 bay monitoring stations covering about 4 miles and 179 ocean stations covering 127 miles. In addition, 264.3 square statute miles of tidal estuarine rivers and shallow back bays form an inner-coastal estuarine network (Fig. A5.2.2-1). New Jersey's ocean jurisdiction extends to 3 nautical miles off-shore, 446 square statute miles. Ocean and bay resources are widely used for swimming, boating, commercial and recreational fishing and shellfish harvest. Thus, there are ample opportunities for direct contact with these waters and high sanitary quality is very important for protection of public health, economics and enjoyment of this valuable resource.

5.2.1 Estuarine and Coastal Recreational Designated Use Assessment Method

Recreational designated use attainment was assessed using several datasets:

- Cooperative Coastal Monitoring Program beach closure data from over 6000 samples collected each between 1997 and 1999 were used to assess recreational uses at designated ocean and bay bathing beaches. Data are managed in an in-house database. Results have been reported in New Jersey's Environmental Indicator Technical Report (NJDEP, 2000b. DRAFT)

- Marine and Coastal Water Quality Monitoring Program fecal coliform data from over 600 samples collected between 1995 and 1997, inclusive, were used to assess recreational use attainment in tidal rivers and estuaries. Data are managed in USEPA's STORET database. Results were published in "Report on Marine and Coastal Water Quality, 1993-97" (NJDEP, October, 1999). This report is available from the NJDEP website: www.state.nj.us/dep.

- USEPA Ocean Monitoring included collection of fecal coliform data from 44 stations, sampled 7-14 times per year; 452 samples were collected in 1997 and 547 samples were collected in 1998. (USEPA, 1999). These data and an assessment of ocean pollution sources were used to assess recreational use attainment in the ocean.

National Shellfish Sanitation Program data provide another dataset that could be used to assess recreational designated use attainment. Integration of this very large dataset will be explored for the 2002 New Jersey Water Quality Inventory Report.

Table 5.2.1-1: Primary Contact Assessment Method for Ocean and Bay Beaches	
Full Support	Less than or equal to 10% of 100 beach days are closed per year
Full Support but Threatened	Less than or equal to 10% of 100 beach days are closed per year but rising levels of bacterial indicator(s) indicate full support will not be met next year.
Partial Support	Between 11% and 25% of 100 beach days are closed per year
No Support	Greater than 25% of 100 beach days are closed per year

Notes:
Water Quality Standard: Compared to NJ DHSS primary contact standard. The NJDHSS Primary Contact Standard requires that single samples contain less than or equal to 200 FC/100 ml. Resampling is required if a sample exceeds 200 FC/100 ml, and beaches are closed if the resample also exceeds the standard. Some beaches may also be closed on a precautionary basis if it is likely that the standard will be exceeded. Secondary contact uses are considered to be met if NJ DHSS for primary contact is met.
Data Source: Cooperative Coastal Monitoring Program Ocean and Bay Beach Closure data reported as an environmental indicator
Spatial Extent of Assessment: 138 back bay beaches estimated to be 150 feet long (beachfront) x 100 feet wide (3.9 square statute miles); 127 miles of ocean beaches estimated to be 150 feet wide .

Table 5.2.1-2: Recreational Designated Use Assessment Method for Ocean Waters	
Full Support	The FC geometric average was greater than 50 MPN/100ml in less than 10% of stations used to assess the waterbody
Full Support but Threatened	FC levels meet full support but statistically significant adverse trends indicate full support will not be attained in 2 years.
Partial Support	The FC geometric average was greater than 50 MPN/100ml in 11-25% of stations used to assess the waterbody
No Support	The FC geometric average was greater than 50 MPN/100 ml in more than 25% of stations used to assess the waterbody
Notes: **Water Quality Standard:** NJ Surface Water Quality Standard for SC Waters (N.J.A.C. 7:9B); Secondary contact uses are considered to be met if SWQS for primary contact is met. **Data Sources:** Cooperative Coastal Monitoring Program FC data from 1998 and 1999; USEPA Ocean Monitoring done by helicopter; FC data for 1998 and 1999 were assessed; best professional judgement of pollution sources in NJ off-shore ocean waters. **Spatial extent of assessment:** Ocean shoreline to 3 miles off-shore (446 square statute miles)	

Table 5.2.1-3: Recreational Use Assessment Method for Estuarine Waters	
Full Support	The FC geometric average was less than 200 MPN/100ml and less than 10 percent of individual samples exceeded 400 MPN/100 ml.
Full Support but Threatened	FC levels meet full support but statistically significant adverse trends indicate full support will not be attained in 2 years.
Partial Support	The FC geometric average was less than 200 MPN/ 100 ml, but more than 10 percent of individual samples exceeded 400 MPN/100 ml.
No Support	The FC geometric average exceeded 200 MPN/100 ml and more than 10 percent of individual samples exceeded 400 MPN/ 100 ml.
Notes: **Water Quality Standard:** NJ Surface Water Quality Standard for SE Waters (N.J.A.C. 7:9B) Secondary contact uses are considered to be met if SWQS for primary contact is met. **Data Sources:** Marine and Coastal Water Quality FC data collected between 1995 and 1997. Data were grouped by waterbody to have at least 10 samples per waterbody assessment. **Spatial Extent of Assessment:** Tidal rivers and back bays from Raritan Bay to the tip of Cape May and Maurice River and Cove. (269.15 square statute miles) Raritan Bay was included because recreational uses were not assessed in the Interstate Sanitation Commission's 2000 Water Quality Inventory Report; Delaware Bay was not included because recreational uses were assessed in the Delaware River Basin Commission's 2000 Water Quality Inventory Report.	

The beach closure environmental indicator provides information that is important to citizens, local officials and environmental managers. The beach closure indicator also provides information regarding local pollution sources that is needed to manage intensely used beach resources.

5.2.2 Estuarine and Coastal Recreational Designated Use Assessment Results

Estuarine Waters
As shown on Figure 5.2.2-1 and Table A5.2.2-1a in the Appendix, recreational designated uses were fully met in all estuarine waters from the tip of Sandy Hook to the tip of Cape May. Recreational designated uses were partially met in the Maurice River and Cove. Thus of 269.15 square statute miles assessed, 98.2% (264.03 sq. miles) fully met recreational uses and 1.8% (4.8 sq. miles)partially met recreational uses between 1995 and 1997.

As discussed in the Report on Marine and Coastal Water Quality, 1993-1997, levels of FC above background indicate the presence of FC sources in several waterbodies. (Zimmer and Groppenbacher, 1999). Additional work is needed to assess trends in FC concentrations and to evaluate potential threats to designated use attainment in these waterbodies.

Table 5.2.2-1: Estuarine Waterbodies Affected by FC Pollution Sources		
• **Monmouth County**		
Navesink River	Shark River	Manasquan River and Inlet
• **Barnegat Bay and Tributaries**		
Metedeconk River	Toms River	Forked River
Silver Bay	Waretown Creek	Westecunk Creek
Mullica River		
• **Atlantic and Cape May County Back Bays**		
Absecon Creek	Great Egg Harbor River	Middle River
Beach Thoroughfare	Inside Thoroughfare	Lakes Bay
Jarvis Sound	Cape May Canal	
• **Delaware Bay**		
Maurice River and Cove	Nautuxent Cove	

Ocean Waters
As shown on Figure 5.2.2-1 and Table A5.2.2-1b in the Appendix, recreational designated uses were fully met in all ocean waters. A review of pollution sources did not identify any significant threats to sanitary quality in ocean waters. Thus of 446 square statute miles assessed, 100% fully met recreational designated uses between 1998 and 1999.

Bathing Beaches
As shown in the Bathing Beach Environmental Indicator Report provided in Appendix A5.2.2-2, recreational designated uses were fully met at all ocean and bay bathing beaches for 1998 and 1999.

5.2.3 Estuarine and Coastal Recreational Designated Use Source and Cause Assessment
Although recreational designated uses were largely met in NJ estuarine and ocean waters, localized problems occur. The following provides a qualitative assessment of the sources fecal coliform where levels are above background levels.

Sources of FC that may affect NJ estuarine and ocean waters include:

- Municipal Stormwater and Runoff – there are over 7000 storm drains that discharge to river and bay estuarine waters. Stormdrains and overland runoff can be a source of FC pollution from pets and other wildlife. More stormdrains are installed each year as coastal areas are developed; runoff increases as impervious areas increase. Figure A5.2.3-1 shows the density of storm drains in the Asbury Park vicinity. Through NJs Sewage Infrastructure Improvement Act Program, cross-connections and inter-connections with sanitary sewer lines have been investigated and largely corrected. As

- Wildlife – congregations of seagulls are a suspected source of FC pollution in some areas.

- Sanitary discharges from boats – although boaters are encouraged to use pump-out stations and No Discharge Zones have been established in some areas, some sanitary discharge from boats probably still occurs.

- Municipal Sewage Treatment Plants – There are 15 municipal STPs that discharge to the ocean in NJ (see Figure 5.2.3-2). Improvements in estuarine water quality occurred as coastal STPs were regionalized and upgraded in the 1980's. Although compliance with FC limits is generally very good, localized problems still occur. For example, sewer line blockage closed beaches in Atlantic City 6 times in 1999.

- Transport from Non-tidal Rivers - The sanitary quality of non-tidal rivers is poor, and recreational designated uses are largely not met in these rivers. Sources of FC pollution to non-tidal rivers include municipal stormwater and runoff, combined sewer overflows, sanitary sewer overflows, and wildlife (primarily geese).

- As discussed in the Designated Use Assessments for Rivers and Streams (Part III, Chapter 3, Section 3.3), sanitary quality was monitored in the Ambient Stream Monitoring Network in the following rivers that flow to estuarine waters: Manasquan, Toms, Mullica, Great Egg, Maurice, Cohansey and Salem. All stations are above the head of tide. The Toms, Mullica and Maurice met SWQS for FC at the downstream sampling stations between 1995 and 1997. Exceedences rates ranged from 15% to 41% in the remaining rivers. These data must be interpreted with caution however, because sampling programs were not conducted concurrently. Additional effort is needed to better evaluate FC inputs from non-tidal rivers to estuarine rivers and bays.

- Transport from Lakes – Field investigations have revealed that lake outlets have lead to bathing beach closures.

5.2.4 Maintaining and Improving Recreational Designated Use Attainment in Coastal Waters

- The Department's Bathing Beach Action Plan to address beach pollution issues is provided as Appendix A5.2.3-1**.**

- The Department will continue to perform aerial surveillance of nearshore coastal waters which enables the routine evaluation of coastal water quality and the assessment of the nature and extent of ocean pollution. Six flights per week, excluding Wednesdays, include Raritan Bay, the Lower New York Bay, and the Atlantic coast from Sandy Hook to Barnegat Inlet. Flights on Thursdays and Sundays are extended to include the area from Barnegat Inlet to Cape May Point.

- As part of the New York-New Jersey Harbor Estuary Program Floatables Action Plan, flight activities are coordinated with the United States Environmental Protection Agency (USEPA) and the United States Army Corps of Engineers' effort to capture floating solid waste and debris, also known as floatables, with water-skimming vessels. Sources of floatables that have affected the State's coastal shores include stormwater outfalls, combined sewer overflows, operational landfills, and illegal dump sites. Surveillance flights continue to record a decrease in the quantity of floatables in the coastal waterways compared to the years prior to 1990.

- In order to address this issue, NJDEP's Water Compliance and Enforcement Element will shift emphasis of weekly summer inspections to include sewage collection systems as well as STP facilities.

- Through the development and implementation of TMDLs for FC pollution in rivers that flow to estuaries, reduction of FC from freshwaters is expected. This reduction is expected to have a positive influence on FC concentrations in coastal waters